

The Alboran and western Algerian basins stratigraphy: a review

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The western Mediterranean is formed by several basins. The Alboran Basin is the westernmost of these Mediterranean basins, and connects toward the east with the Algero-Balearic Basin. To understand its tectono-sedimentary evolution is fundamental to establish a general geodynamic model for the entire region. However, regional studies are mainly from the 90's. These studies proposed a general stratigraphy for the area based on the well data and its correlation with seismic profiles. The restricted seismic coverage and generally low quality (old acquisition and processing methods), penetration and resolution of the seismic profiles were not enough to perform a detailed analysis of the entire sediment infill. More recent works characterize in detail a particular area, but the correlation between the different sub-basins remained beyond the scope of those works. Furthermore, most recent works are usually focused only on the Messinian and younger stratigraphy. These results in a bunch of models, different for each sub-basin and not always coherent among them, which makes difficult the understanding of the geodynamic evolution of the region. On the basis on new multichannel seismic profiles (more than 4500 km of new seismic profiles from TOPOMED, ESCI-Alb and EVENTDEEP projects), together with existing datasets and well and dredge data, we are able to review the Alboran Basin stratigraphy at an entire basin scale.

We present for the first time a coherent stratigraphy for the entire region, and we interpreted the results in terms of geodynamic evolution. This allows us to refine the proposed geodynamic models for this region. The main objectives are: (i) To define a seismostratigraphy framework for the entire region, integrating previous interpretations and available well information; (ii) To establish a correlation between units of different sub-basins, integrating previous detailed studies of each depocenter; (iii) To characterize comparatively the sedimentary record of the main depocenters of the western Mediterranean; (iv) To propose an evolutionary model for each sub-basin; and (v) To review the geodynamics models on the basis of this results and to integrate all sub-basins results in an updated general kinematic model for the westernmost Mediterranean region.

Main results shed light on the particular evolution of each sub-basin as well as in the entire basin evolution. While the Miocene represents the formation stage of the basin, the Plio-Quaternary corresponds to the deformation stage. This latter period is characterized by contractional deformation. Deformation is accommodated mainly by re-activation of pre-existing crustal structures, such as the Carboneras Fault, the Yusuf Fault or the Alboran Ridge front fault.

Keywords: basin evolution, stratigraphy, volcanism, tectonics, geodynamic evolution.